

IN THE CLAIMS:

1 1. (Original) A method of determining resistance in a fuel cell, including the steps
2 of:

3 (A) measuring an initial stack current and stack voltage;
4 (B) changing fuel cell stack load across the fuel cell;
5 (C) substantially immediately reading the output voltage and current of the
6 fuel cell; and
7 (D) calculating the resistance of the fuel cell.

1 2. (Original) The method of determining resistance in a fuel cell, as defined in claim
2 1, including the further steps of:

3 (A) coupling constant current with the fuel cell to set stack current;
4 (B) waiting a predetermined time period for the output voltage of the fuel cell
5 to stabilize;
6 (C) measuring the output voltage of the fuel cell;
7 (D) changing the fuel cell current;
8 (E) substantially immediately reading the output voltage of the fuel cell; and
9 (F) calculating the resistance of the fuel cell.

1 3. (Original) The method of determining resistance, as defined in claim 2 including
2 the further step of

3 evaluating any changes in said calculated resistance over time as a measure of
4 fuel cell hydration.

1 4. (Original) The method of determining resistance in a fuel cell, as defined in claim
2 1, including the further steps of:

3 (A) switching a fixed resistance load onto said fuel cell;
4 (B) allowing the fuel cell stack voltage to stabilize at a first voltage level;
5 (C) removing the fixed resistance;
6 (D) substantially immediately measuring the new stack voltage; and
7 (E) calculating the fuel cell resistance based upon the change between the first
8 voltage level and the new stack voltage.

1 5. (Currently Amended) The method of determining resistance as defined in claim 1
2 including the further steps of:

3 (A) providing a DC-DC converter with an associated microcontroller;
4 (B) adjusting input parameters of said DC-DC converter, using said microcon-
5 troller, to establish an initial duty cycle;
6 (C) reading the stack voltage and the stack current;
7 (D) chargingchanging the duty cycle;
8 (E) substantially immediately measuring the fuel cell voltage and fuel cell cur-
9 rent; and
10 (F) calculating resistance based upon measurements.

1 6. (Original) The method of determining resistance, as defined in claim 1 including
2 the further step of

3 evaluating any changes in resistance over time as a measure of fuel cell hydration.

1 7. (Original) The method of determining resistance, as defined in claim 1, wherein
2 said fuel cell comprises one of the following:

3 (A) a fuel cell stack;
4 (B) a fuel cell array; and
5 (C) an individual fuel cell.

1 8. (Original) The method of determining resistance, as defined in claim 3, wherein a
2 fuel cell in said fuel cell stack, said fuel cell array, or said individual fuel cell is a direct
3 oxidation fuel cell.

1 9. (Original) The method of determining resistance, as defined in claim 4, wherein
2 said direct oxidation fuel cell is a direct methanol fuel cell.

1 10. (Original) The method of determining resistance, as defined in claim 3, wherein a
2 fuel cell in said fuel cell stack, said fuel cell array, or said individual fuel cell is a hydro-
3 gen fuel cell.

1 11. (Withdrawn) A system of measuring resistance of a fuel cell means, comprising:
2 (A) a fuel cell means which generates an output voltage and an output current;
3 (B) a fixed load circuit connected in parallel with said fuel cell means respon-
4 sive to a control signal for switching said fixed load circuit across said fuel cell means;
5 and
6 (C) a measuring device coupled to said fuel cell that measures desired param-
7 ters related to the resistance across the fuel cell means.

1 12. (Withdrawn) The system as in claim 11 wherein said fuel cell means is a direct
2 oxidation fuel cell stack.

1 13 (Withdrawn) The system as in claim 11 wherein said fuel cell means is a direct
2 oxidation fuel cell array.

1 14. (Withdrawn) The system as in claim 11 further comprising a DC-DC converter
2 circuit having input that is connected to receive the output voltage from said fuel cell

3 means and being responsive to said control signal for varying the opening and closing of
4 switches within said DC-DC converter such that a load is switched on and off said fuel
5 cell means and said measuring device has means for measuring the resistance of the fuel
6 cell means, when said switches are turned on, and when turned off.

1 15. (Original) A method of measuring resistance in a fuel cell stack being used as a
2 power source, comprising the steps of:

- 3 (A) using a fuel cell stack to produce power that can be supplied to a battery or
4 load;
- 5 (B) switching a fixed load across said fuel cell stack;
- 6 (C) reading the voltage across the stack after a predetermined time period
7 when said fixed load circuit is on;
- 8 (D) turning off the load;
- 9 (E) substantially immediately reading the stack voltage; and
- 10 (F) determining stack resistance based upon a change in said stack voltage
11 readings.

1 16. (Original) A method of measuring resistance across a direct oxidation fuel cell
2 stack that includes programmable DC-DC switches including the steps of:

- 3 (A) using said programmable DC-DC switches to switch a load on and off said
4 fuel cell stack;
- 5 (B) signaling an associated microprocessor under pulse-width modulation con-
6 trol to adjust the duty cycle of said DC-DC switches
- 7 (C) measuring voltage changes as said switches change;
- 8 (D) calculating a change in resistance over time; and

9 (E) predicting cell hydration based upon said changes.